The Geography of Trade on eBay (and MercadoLibre)

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Broad Questions

- What are the geographic patterns of trade on the Internet?
- How, if at all, will(has) the Internet affect(ed) geographic patterns of trade?

Literature

- "Death of Distance," Cairncross
- "In a World without Borders," Goolsbee
- "On the Effect of the Internet on International Trade," Freund and Weinhold
- Blum and Goldfarb

"Gravity" literature

- Distance and especially border-crossings matter a lot (Anderson and van Wincoop (2004), Hillberry and Hummels (2003), Coval and Moskowitz (1999), many many others)
- Do informational frictions play a role?
  - Language and cultural similarities (Guiso, Sapienza and Zingales (2005))
  - Chinese immigrant networks (Rauch and Trindade 1999)
  - Telephone traffic and cross-border banking (Portes and Rey 2003)

eBay as proxy for (retail) e-commerce

- $34.2 billion in merchandise sales in 2004
- 15 million listings active every day
- Forrester survey: close to 30% of surveyed households have bid on online auctions

eBay as frictionless limit?

- Minimal search costs
- Uniform market clearing mechanism
- Uniform shipping costs (within continental U.S.)

Data

- 30 main categories on eBay
- Daily random sampling of listings in each (main) category, weighted by category population
- CAVEAT!!! only see buyer location if buyer made sale
- Only know locations of 27% of buyers
- Sample selection: more experienced buyers

Model(??)

- S seller types, B buyer types
- N_s sellers of type s, N_b buyers of type b
- Seller j, with "type" s_j puts up an item for sale
- WTP of buyer i of type b_i for the item:

$$v_{ij} = \gamma + \mu_{b_i,s_j} + \varepsilon_{ij}$$

- Goods sold through simultaneous auctions
- Assumption: auction mechanism is efficient, i.e. awards each good to buyer with highest willingness-to-pay
- IID extreme value disturbances lead to:
  $\Pr\{\text{type } b \text{ wins auction of type } s\} =$

$$\frac{N_b \exp(\gamma + \mu_{b,s})}{\sum_{b'=1}^{B} N_{b'} \exp(\gamma + \mu_{b',s})}$$

- Take logs:

$$\log \Pr\{b, s\} = logc_s + \log N_b + \gamma + \mu_{b,s}$$

where

$$c_s = \sum_{b'=1}^{B} N_{b'} \exp(\gamma + \mu_{b',s})$$

- "Gravity" equation:

$$\log T_{b,s} = k_s + \log T_s + \log N_b + \mu_{b,s} + \nu_{b,s}$$

- T_s is total number of transactions conducted by sellers of type s
- $T_{b,s}$ is number of realized transactions between buyers of type b and sellers of type s.

Table F

Impact of Distance on Internet Trade

In this table we regress measures of interstate trade on distance and economy size. We use a stratified sample of eBay listings with US buyers and sellers taken between February and May 2004. The dependent variable – intrastate trade – is measured in models 1-3 by the log of the number of transactions between state s (seller) and state b (buyer) while in models 4 and 5 it is measured by the log of the dollar value of these transactions. We measure distance as the great-circle distance between state capitals. For intrastate distances we use Wolf's (2000) formula, which utilizes the (population weighted) distance between the two most populous cities within a state. SAME_STATE is a dummy variable that takes the value of 1 if buyer and seller are located in the same state and 0 otherwise. The total number of transactions with state sellers or buyers proxies for the size of the economy. Models VI and VII are included for comparison purposes and present the results of Wolf (2000) and Hillberry and Hummels (2003). All coefficients are significant at the 1% level.

	Model I	**Model II**	**Model III**	**Model IV**	**Model V**	**Model VI**	**Model VII**
	EBay	**eBay**	**eBay**	**eBay**	**eBay**	**Wolf (2000)**	**Hillberry & Hummels (2003)**
	ln(# trans)	**ln(# trans)**	**ln(# trans)**	**ln($ sales)**	**ln($ sales)**	**1993 CFS**	**1997 CFS[a]**
DISTANCE_sb (1000km)	-0.096						
ln(DISTANCE_sb)		-0.127	-0.055	-0.10	-0.08	-1.00	-1.05
SAME_STATE			0.43	0.64	0.63	1.48	0.44
ln(T_s)	1.01	0.99	0.97	0.98	(seller f.e.)	1.02	(seller f.e.)
ln(T_b)	1.01	0.99	0.97	0.82	(buyer f.e.)	0.98	(buyer f.e.)
Observations	2297	2297	2297	2297	2297	2304	2304
Adj. R^2	0.98	0.98	0.98	0.91	0.93	0.84	0.91

[a] Excluding wholesale

Notes: Wolf (2000) and Hillberry-Hummels (2003) use the Commodity Flow Survey of the U.S. Census, which covers a representative sample of shipment from U.S. mining, manufacturing, and wholesale establishments.
Wolf (2000) uses driving distances obtained from Rand-McNally.
Hillberry and Hummels (2003) use actual shipping distances collected by the Commodity Flow Survey.

Table FA
Impact of Distance on Internet Trade

In this table we analyze the impact of distance on international and interprovince trade through the Internet. The sample includes all the transactions completed in the MercadoLibre sites during the period August 2003 to July 2004. The dependent variable is measured the log of the dollar value of the transactions between country/province s (seller) and country/province b (buyer). For models 1-3 the geography unit is the country while in models 4-6 is the province. We measure distance as the great-circle distance between state capitals. For intrastate distances we use Wolf's (2000) formula, which utilizes the (population weighted) distance between the two most populous cities within a state. SAME COUNTRY is a dummy variable that takes the value of 1 if buyer and seller are located in the same country and 0 otherwise. SAME PROVINCE is a dummy variable that takes the value of 1 if buyer and seller are located in the same province and 0 otherwise.

	Model I	**Model II**	**Model III**	**Model IV**	**Model V**	**Model VI**
ln(DISTANCE_sb)	-3.536	-0.696	-0.194	-1.030	-0.377	-0.393
	(0.000)	(0.269)	(0.676)	(0.000)	(0.000)	(0.000)
SAME PROVINCE					-0.132	
					(0.573)	
SAME COUNTRY		10.769			6.081	6.049
		(0.000)			(0.000)	(0.000)
Seller fixed effects	country	country	country	province	province	province
Buyer fixed effects	country	country	country	province	province	province
Observations	79	79	69	7175	7175	6968
Adj. R^2	0.48	0.69	0.57	0.34	0.69	0.69

Why isn't distance dead?

- Bad distance measurement
- Unobserved, distance-dependent shipping costs
- Immediacy
- Sales taxes?
- Local preferences
- Trust
- Availability of local retail outlets

Table G
Impact of Distance on Internet Trade
The Role of Shipping Costs, Time Zone, and Large States

In this table we test whether the effect of distance on interstate trade is caused by shipping costs, differences in time zone among states, or by the influence of large states in the regressions. We use a stratified sample of eBay listings with US buyer and seller taken between February and May 2004. The dependent variable is the log of the dollar value of transactions between state s (seller) and state b (buyer). We measure distance as the great-circle distance between state capitals. For intrastate distances we use Wolf's (2000) formula, which utilizes the (population weighted) distance between the two most populous cities within a state. SAME_STATE is a dummy variable that takes the value of 1 if buyer and seller are located in the same state and 0 otherwise. SHIPPING COST is the average transportation cost for shipments from state s to state b in percentage. SAME TIME ZONE is a dummy variable that takes the value of 1 if buyer and seller and in states with the same time zone and 0 otherwise.

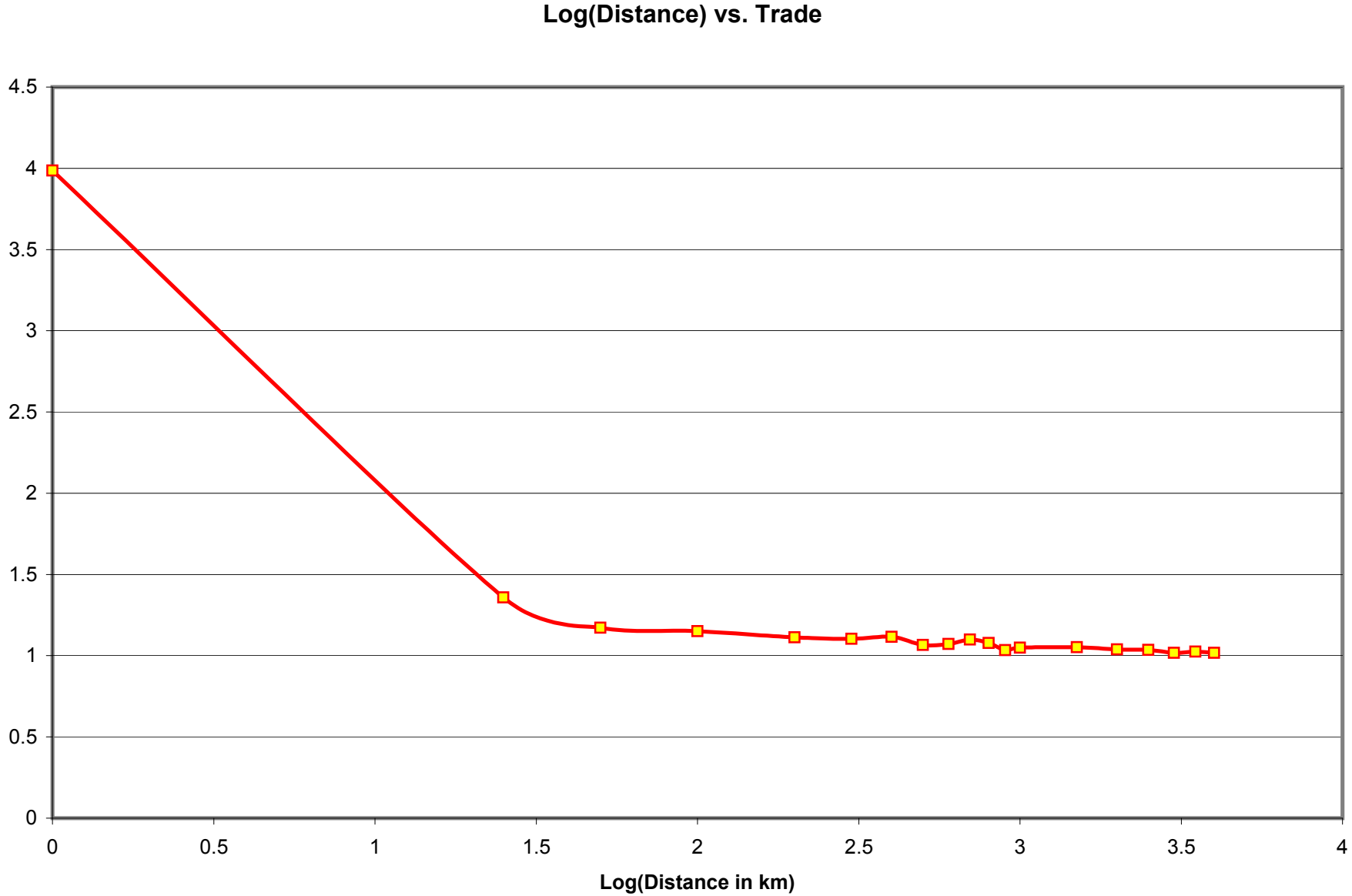
	Model I Shipping Rate	**Model II Time Zone**	**Model III Large States**
ln(DISTANCE_AB)	-0.06***	-0.07***	-0.15***
	(0.02)	(0.01)	(0.04)
SAME STATE	0.84***	0.83***	0.72***
	(0.05)	(0.05)	(0.06)
SHIPPING COST (%)	-0.03***	-0.03***	
	(0.01)	(0.01)	
SAME TIME ZONE		0.04	
		(0.03)	
SAME STATE CA			-0.80***
			(0.08)
SAME STATE NY			0.27***
			(0.10)
SAME STATE FL			1.80***
			(0.13)
SAME STATE TX			0.14
			(0.13)
SAME STATE MT			4.57***
			(1.02)
Seller state fixed effects	Yes	Yes	Yes
Buyer state fixed effects	Yes	Yes	Yes
Observations			
Adj. R^2			

Note: State abbreviations: CA (California); NY (New York); FL (Florida); TX (Texas); MT (Montana).

Table H
Impact of Distance on Internet Trade. The Role of Trust and Taxes

In this table we test whether the effect of distance on interstate trade is caused by taxes or trust. We use a stratified sample of eBay listings with US buyer and seller taken between February and May 2004. The dependent variable is the log of the dollar value of transactions between state s (seller) and state b (buyer). We measure distance as the great-circle distance between state capitals. For intrastate distances we use Wolf's (2000) formula, which utilizes the (population weighted) distance between the two most populous cities within a state. SAME_STATE is a dummy variable that takes the value of 1 if buyer and seller are located in the same state and 0 otherwise. BAD SELLER is a dummy variable that takes the value of 1 if the seller has a rating between 98% and 99% and 0 otherwise. VERY BAD SELLER is a dummy variable that takes the value of 1if the seller has a rating below 98% and 0 otherwise. (TAX==X%) are dummy variables to account for the level of state sales taxes; state rates are rounded up to the numbers included; states with sales tax rate equal to or higher than 7% (e.g. CA) are captured by the intercept.

	Model I Seller feedback	**Model II Sales Taxes**	**Model III Feedback & Taxes**
ln(DISTANCE)	-0.09***	-0.10**	-0.12***
	(0.01)	(0.05)	(0.05)
SAME STATE	0.42***	-0.01	-0.07
	(0.06)	(0.18)	(0.18)
ln(DISTANCE)*BAD_SELLER	-0.01**		-0.01**
	(0.005)		(0.004)
ln(DISTANCE)*VERY BAD SELLER	-0.02**		-0.02**
	(0.01)		(0.01)
SAME STATE * BAD SELLER	0.60***		0.34***
	(0.07)		(0.11)
SAME STATE * VERY BAD SELLER	0.68***		0.40
	(0.24)		(0.25)
LN(DISTANCE) * (TAX==6%)		0.02	0.03
		(0.06)	(0.06)
LN(DISTANCE) * (TAX==5%)		-0.04	-0.02
		(0.06)	(0.06)
LN(DISTANCE) * (TAX==4%)		0.004	0.02
		(0.06)	(0.06)
LN(DISTANCE) * (TAX==3%)		0.13	0.15
		(0.09)	(0.09)
LN(DISTANCE) * (TAX==0%)		-0.10	-0.08
		(0.08)	(0.08)
SAME STATE * (TAX==6%)		0.84***	0.64***
		(0.22)	(0.24)
SAME STATE * (TAX==5%)		0.61***	0.64***
		(0.20)	(0.20)
SAME STATE * (TAX==4%)		0.98***	0.83***
		(0.21)	(0.22)
SAME STATE * (TAX==3%)		1.07***	1.11***
		(0.33)	(0.33)
SAME STATE * (TAX==0%)		0.62**	0.54
		(0.35)	(0.35)
Seller state fixed effects			
Buyer state fixed effects			
Observations			
Adj R^2	0.94	0.94	0.94


Log(Distance) vs. Trade
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Log(Distance in km)

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http://search.ebay.com/ws/search/SaleSearch?sofocus=bs&satitle=the+incredibles&sacat=-1%26catref%3DC5&fbd=1&amp%3Bsspagename=h%3Ah%3Aadvsearch%3

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e incredibles All Categories Search Advanced Search

Search title **and** description

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VD (4)
thing, Shoes &
cessories (2)
fants & Toddlers (2)
llectibles (2)
isneyana (2)
ys & Hobbies (1)
leo Games (1)

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Items within
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miles of 60613

ow only:
Items listed with PayPal
Buy It Now items
Gift items

10 items found for **the incredibles**

Add to Favorite Searches

Location: Items near 60613 (within 50 mi) Show all

Products:
- **DVD:** The Incredibles (2005)
- **DVD:** The Incredibles (2005)
- **Game:** Disney's The Incredibles (Nintendo GameCube, 2004)

Or Try: Toys & Hobbies > TV, Movie, Character Toys > Disney > Incredibles

List View | Picture Gallery

Sort by: Distance: nearest first Customize Displa

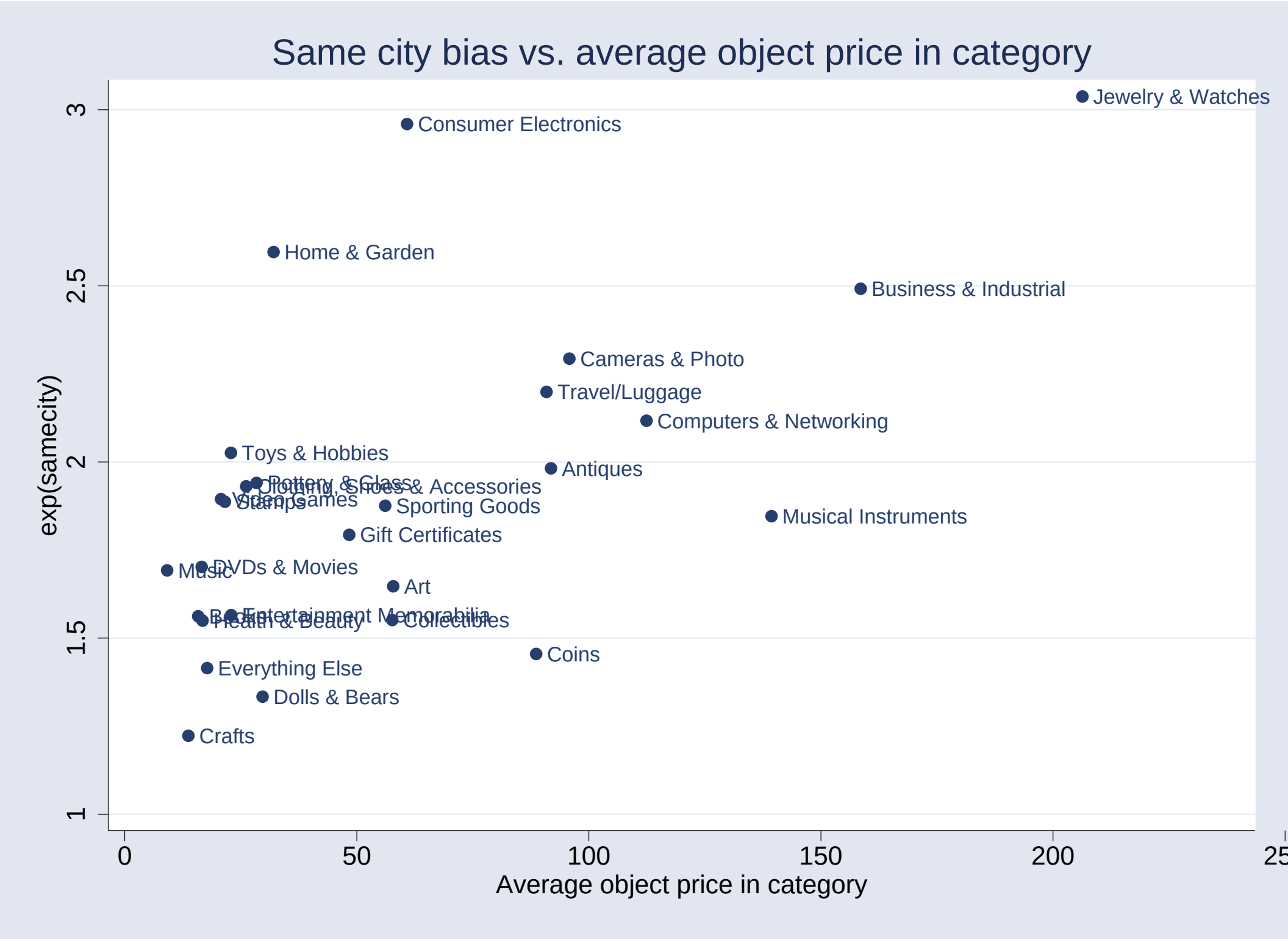
Compare	Item Title	PayPal	Bids	Price	Shipping	Time Left	Distance
Distances shown approximately in miles from: 60613 change							
	The Incredibles 2 Disc Collector's Edition FS DVD PIXAR	PayPal	-	**$7.50**	Calculate	1d 21h 14m	< 5 mi Illinois
	The Incredibles 2 Disc Collector's Edition FS DVD PIXAR	PayPal	-	**$9.75**	Calculate	4d 01h 16m	< 5 mi Illinois
	DISNEY PINS The Incredibles Collection (Jack Jack) PIN	PayPal	-	**$2.99**	$2.75	4d 11h 37m	15 mi Illinois
	DISNEY PINS The Incredibles Collection (The Family)	PayPal	-	**$2.99**	$2.75	4d 11h 38m	15 mi Illinois
	McDonalds Happy Meal Disney The Incredibles Comlete Set	PayPal	2	**$9.99**	$6.50	5d 11h 50m	30 mi Illinois

Internet

Table I
Impact of Distance on Trade Patterns of Different Types of Goods

In this table we rank the coefficients of the same city dummy variables in regressions of measures of intrastate trade on distance and economy size by category of good traded. We use a stratified sample of eBay listings with US buyer and seller taken between February and May 2004. We run the regression for each of the 30 main categories of goods in eBay. The dependent variable is the log of the dollar value of the transactions between state s (seller) and state b (buyer). We measure distance as the great-circle distance between state capitals. For intrastate distances we use Wolf's (2000) formula, which utilizes the (population weighted) distance between the two most populous cities within a state. SAME_CITY is a dummy variable that takes the value of 1 if buyer and seller are located in the same state and 0 otherwise.

Category	"Same city" coefficient
Tickets	3.049
Sports Mem., Cards & Fan Shops	1.571
Jewelry & Watches	1.111
Consumer Electronics	1.085
Home & Garden	0.954
Business & Industrial	0.913
Cameras & Photo	0.83
Travel/Luggage	0.788
Computers & Networking	0.75
Toys & Hobbies	0.706
Antiques	0.684
Pottery & Glass	0.663
Clothing, Shoes & Accessories	0.658
Video Games	0.639
Stamps	0.635
Sporting Goods	0.629
Musical Instruments	0.613
Gift Certificates	0.584
DVDs & Movies	0.532
Music	0.526
Art	0.499
Entertainment Memorabilia	0.448
Books	0.446
Collectibles	0.439
Health & Beauty	0.438
Coins	0.375
Everything Else	0.347
Dolls & Bears	0.288
Crafts	0.201


Same city bias vs. average object price in category
exp(samecity)
1
1.5
2
2.5
3
0
50
100
150
200
25
Average object price in category
Jewelry & Watches
Consumer Electronics
Home & Garden
Business & Industrial
Cameras & Photo
Travel/Luggage
Computers & Networking
Toys & Hobbies
Antiques
Pottery & Glass
Clothing, Shoes & Accessories
Video Games
Stamps
Sporting Goods
Musical Instruments
Gift Certificates
Music
DVDs & Movies
Art
Health & Beauty
Collectibles
Coins
Everything Else
Dolls & Bears
Crafts

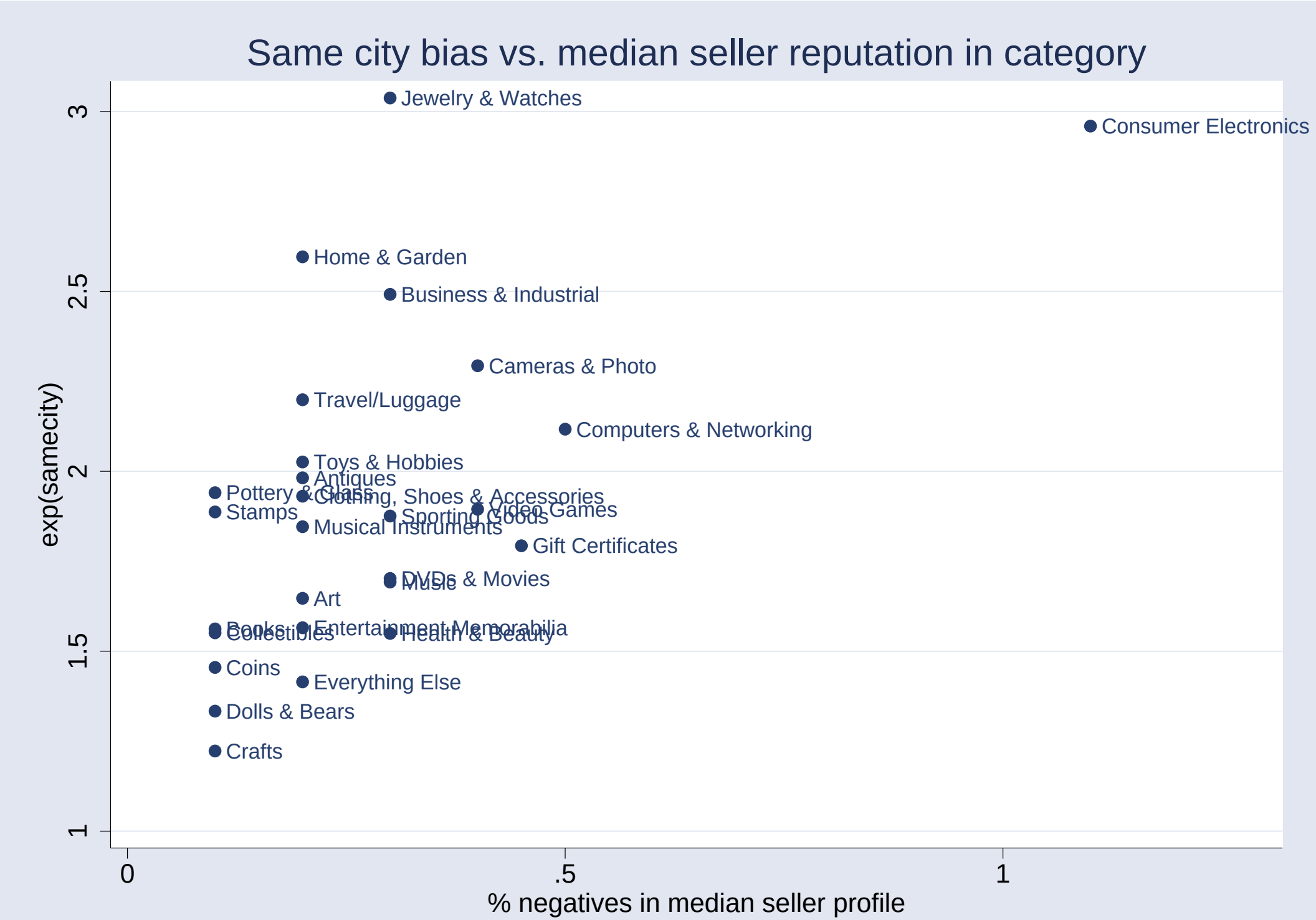

Same city bias vs. median seller reputation in category
exp(samecity)
1
1.5
2
2.5
3
0
.5
1
% negatives in median seller profile
Jewelry & Watches
Consumer Electronics
Home & Garden
Business & Industrial
Cameras & Photo
Travel/Luggage
Computers & Networking
Toys & Hobbies
Antiques
Pottery & Glass
Clothing, Shoes & Accessories
Stamps
Sporting Goods
Video Games
Musical Instruments
Gift Certificates
DVDs & Movies
Music
Art
Books
Entertainment Memorabilia
Collectibles
Health & Beauty
Coins
Everything Else
Dolls & Bears
Crafts

Table J
Impact of Distance on Trade Patterns of Different Types of Goods

In this table we regress the impact of distance on trade on characteristics of the goods traded and the reputation of their sellers. The dependent variable is the coefficient of the same city dummy variables from regressions of measures of intrastate trade on distance and economy size by category of good traded. We use a stratified sample of eBay listings with US buyer and seller taken between February and May 2004. We exclude from the regression the categories with extreme same city coefficients. E[Weight] and E[Price] are the average weight and price respectively of the goods sold in the category. Seller's reputation is measured by the median percentage of negative feedback received by sellers in the category.

	Dependent Variable: Coefficient on SAME_CITY
E[Weight] in Category	-0.021
	(0.014)
%Negatives in Median Seller's Record	1.112
	(0.307)***
E[Price] in Category	0.0047
	(0.0012)***
Observations	27
R^2	0.53

Alternative explanation: Shill Bidding?

- Pro: High value, low rating might suggest this
- Pro: Also true that a high percentage of buyers are repeat buyers
- Pro: Fraction of repeat buyers among "same city" buyers is slightly higher compared to non "same city" buyers (18.2% vs. 15%).
- Con: Why would sophisticated shillers declare their location truthfully?
- Con: Buyers are also sellers in this data set. Why would sophisticated shillers use buyer ID to sell?
- Have to do more in depth study of bidding patterns

Conclusions: Why isn't distance dead?

Evidence for:

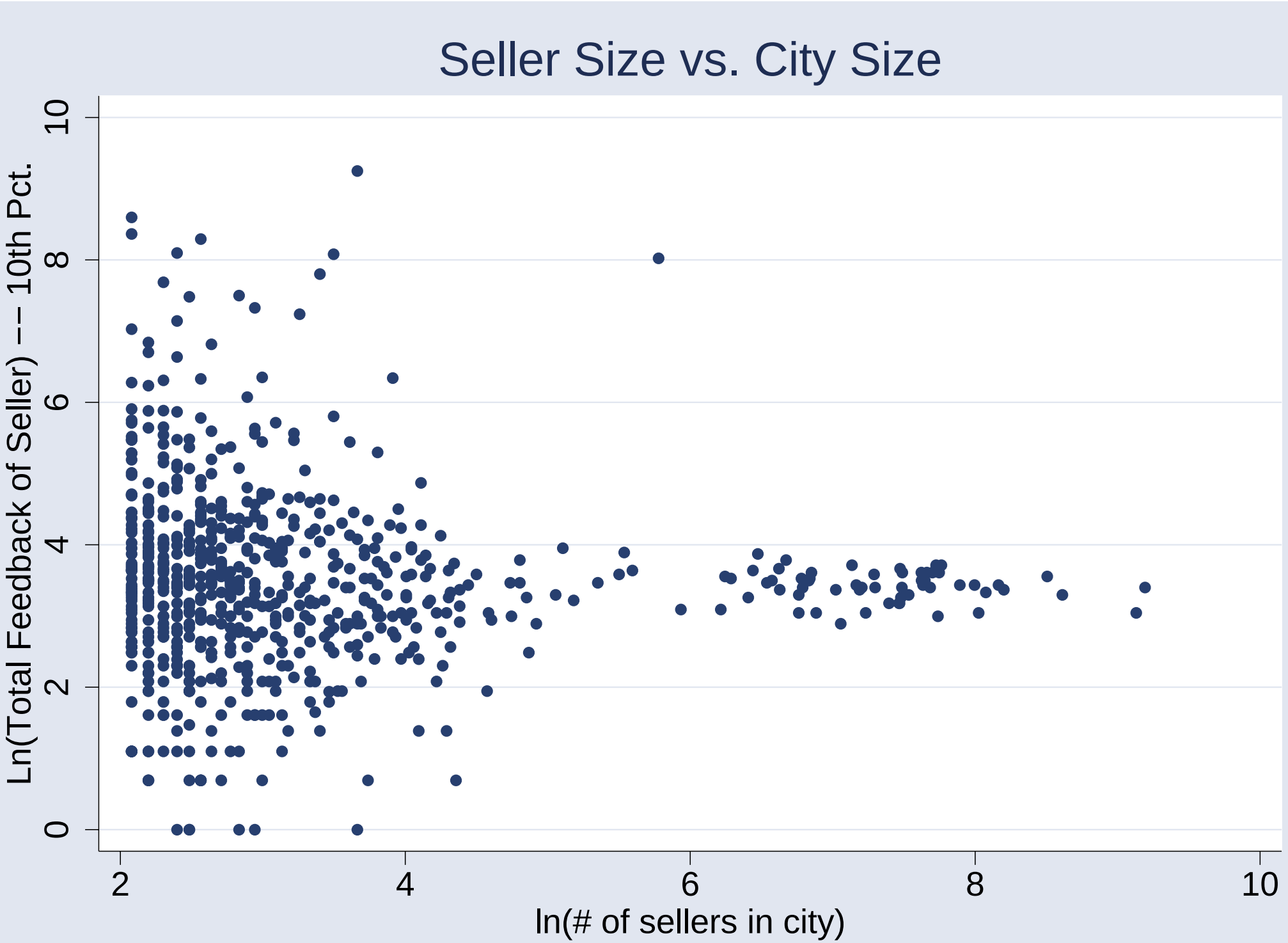
- Local preferences: Yes
- Trust: Yes
- Immediacy and unobserved, distance-dependent shipping costs: shouldn't this be linear?
- Shill bidding?

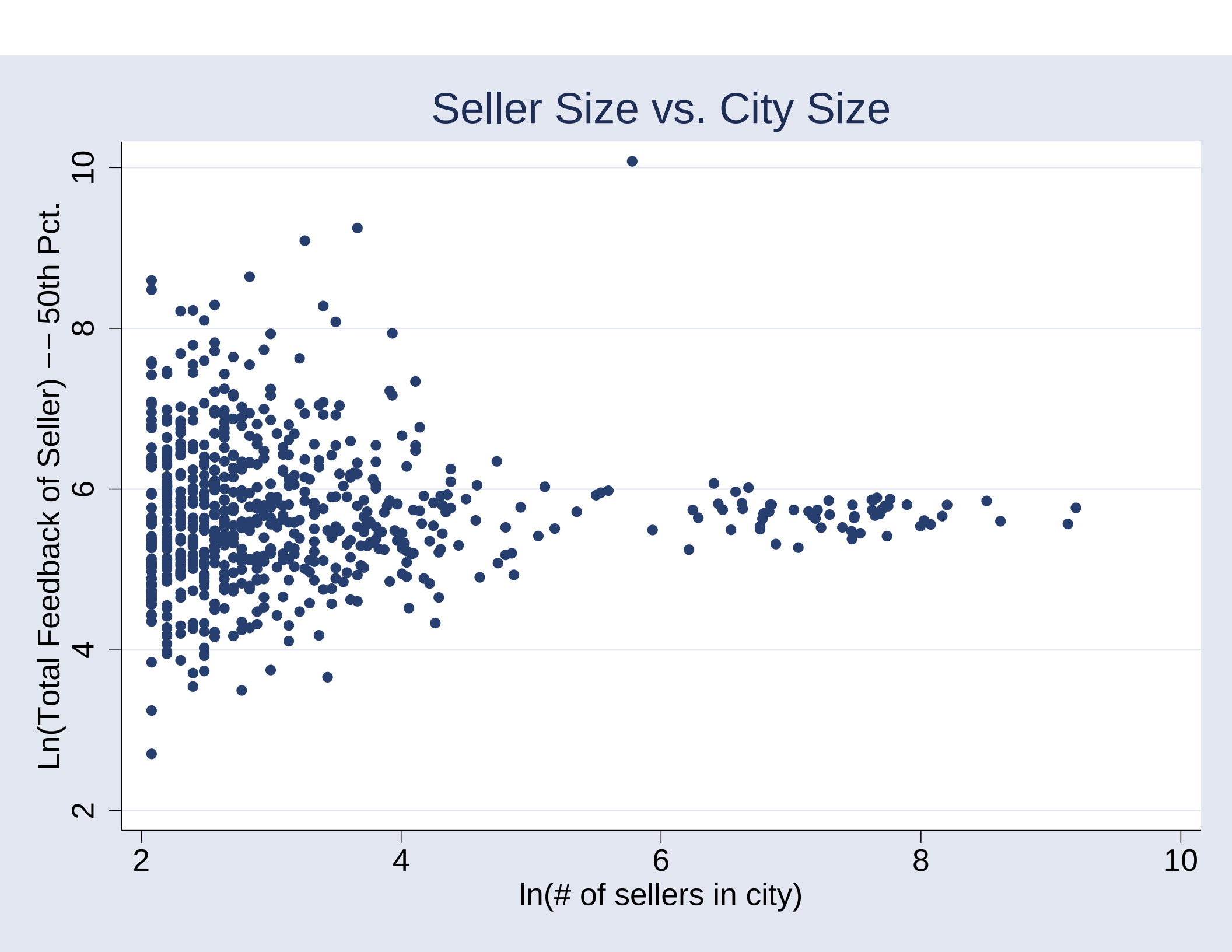
Item Level ln(Price) Regressions

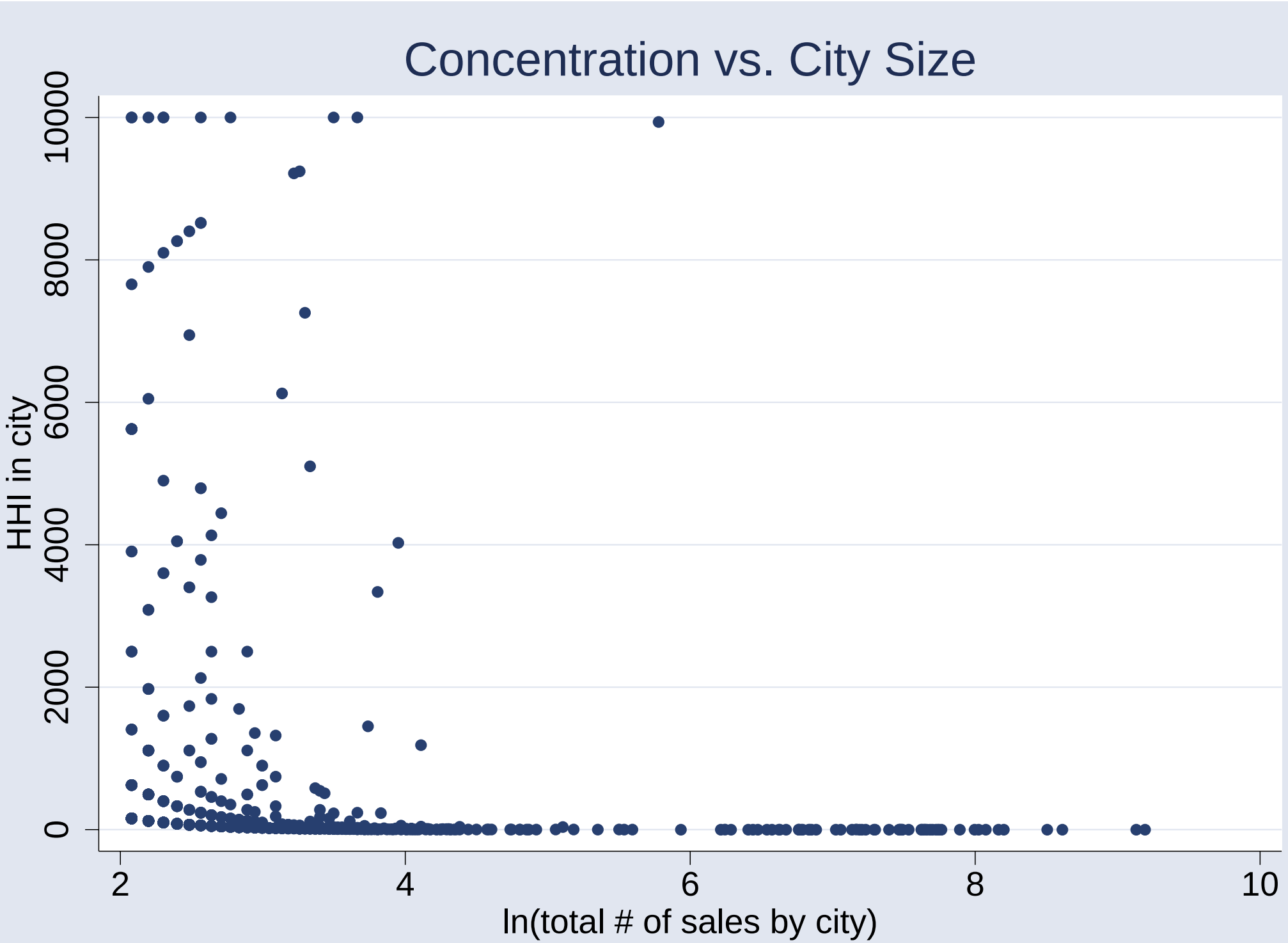
	All Items	Within Top Category	Within Detailed Category
Same City	0.42	-0.02	-0.06
km25	0.72	0.05	0.00
km50	0.76	0.03	-0.08
km100	0.70	0.13	0.06
km200	0.37	0.06	0.01
km300	0.11	-0.01	-0.01
km400	0.11	-0.02	-0.02
km500	0.03	-0.04	-0.05
km600	0.07	-0.02	-0.02
km700	-0.04	-0.08	-0.06
km800	0.01	-0.03	-0.01
km900	-0.03	-0.04	-0.04
km1000	0.01	-0.01	0.00
km1500	-0.02	-0.04	-0.03
km2000	0.01	0.00	-0.02
km2500	0.01	-0.01	-0.02
km3000	-0.02	-0.04	-0.04
km3500	-0.08	-0.07	-0.04
Bad seller	-0.17	-0.20	-0.16
Very bad seller	-0.28	-0.28	-0.33
Paypal	-0.04	-0.05	-0.04
bpopulation	0.00	0.00	0.00
spopulation	0.00	0.00	0.00
Shipping	0.04	0.03	0.02
Constant	2.25	2.37	2.45

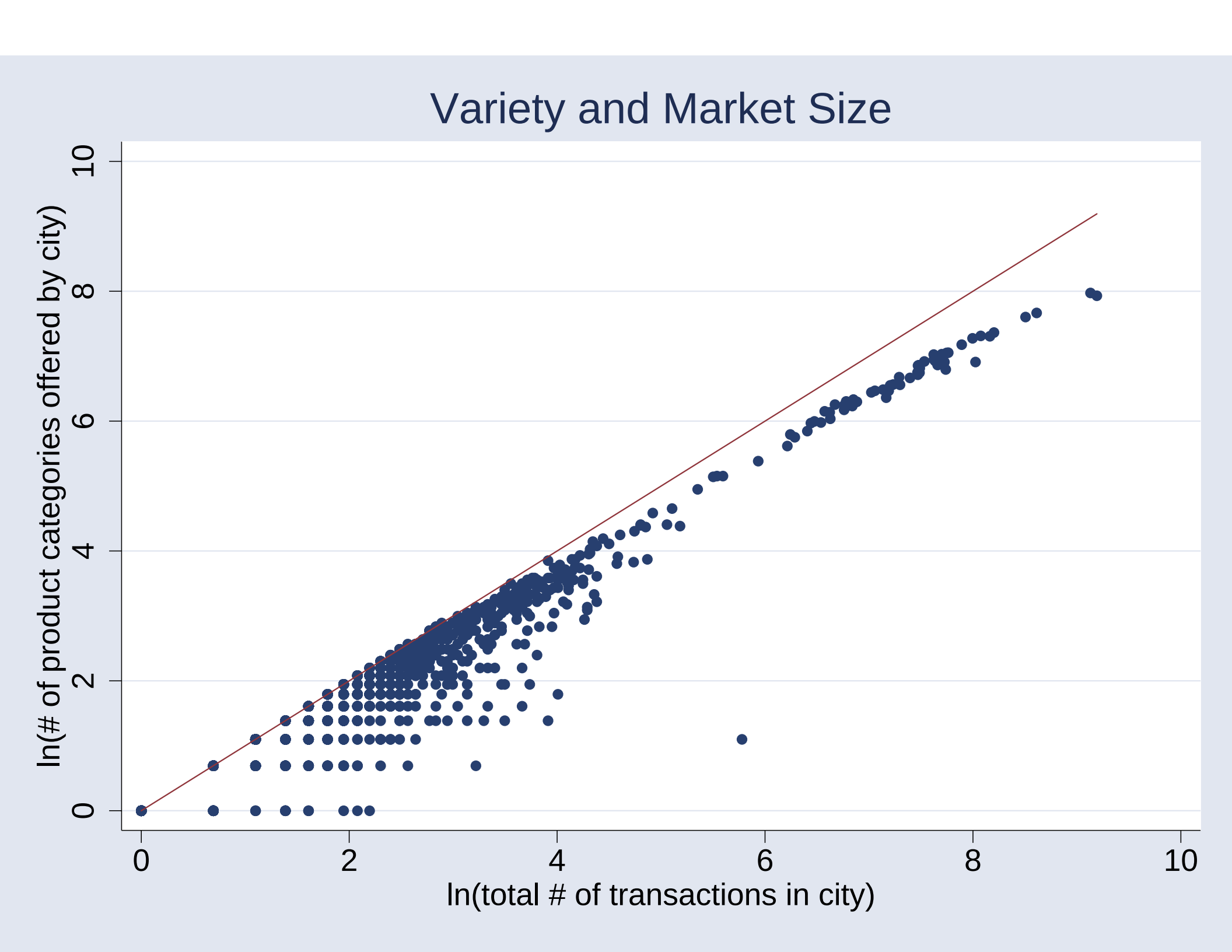
Implications on Market Structure

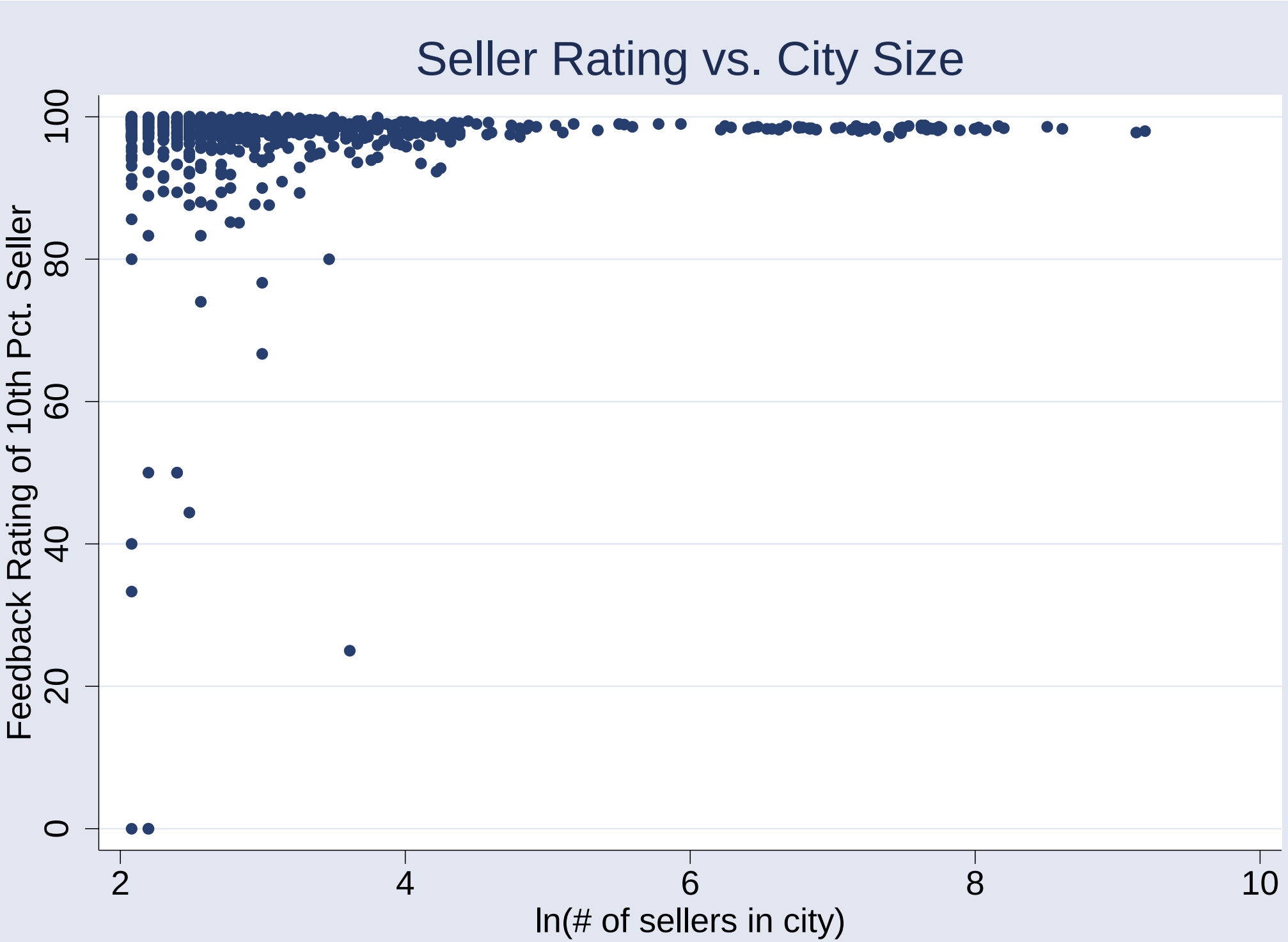
- Given same city bias, can we talk about geographically separated markets on the Internet?
- Even so, market structure depends on demand structure
- Vertical vs. horizontal differentiation/ESG?

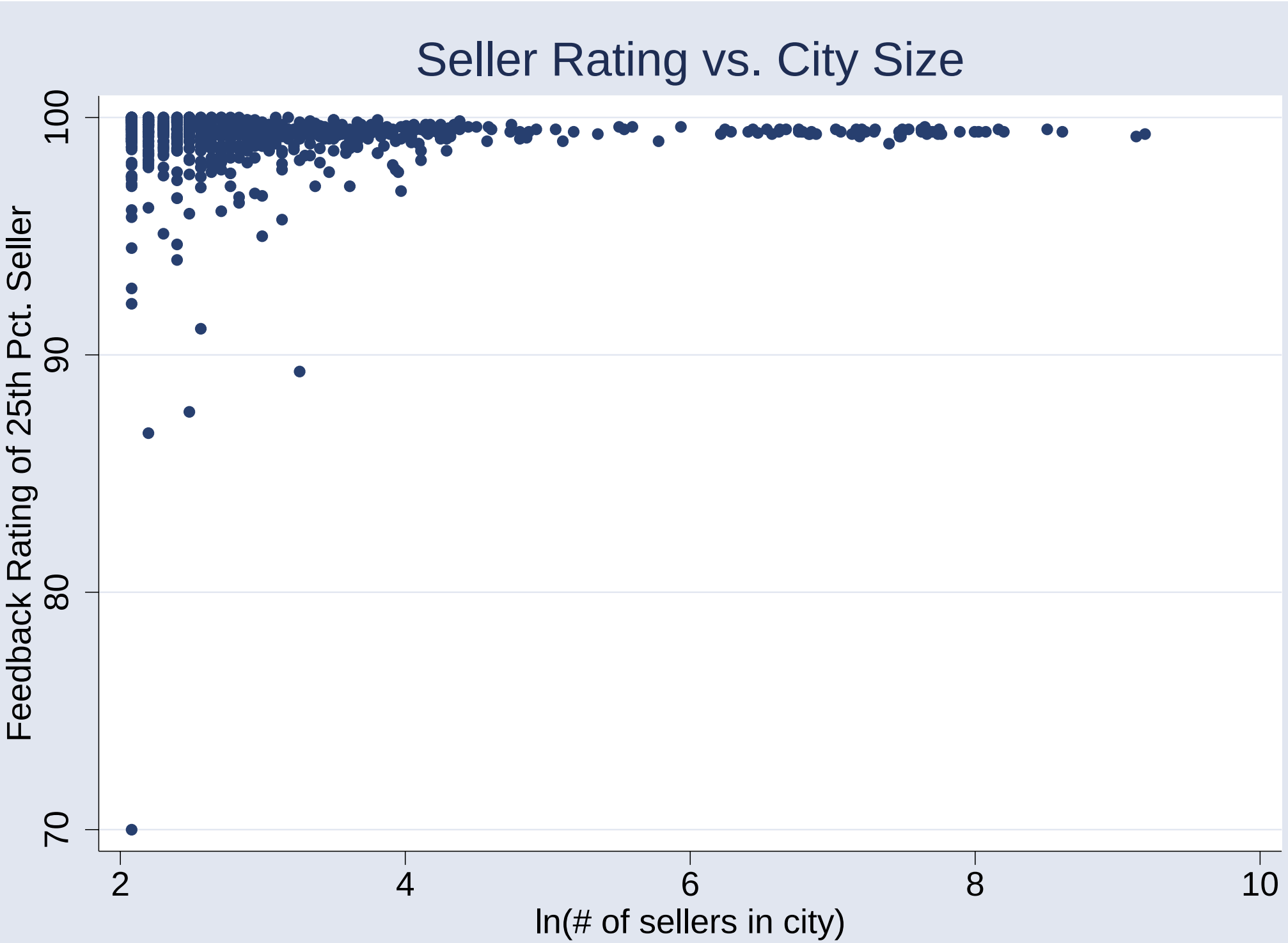

Seller Size vs. City Size
Ln(Total Feedback of Seller) -- 10th Pct.
0
2
4
6
8
10
2
4
6
8
10
ln(# of sellers in city)

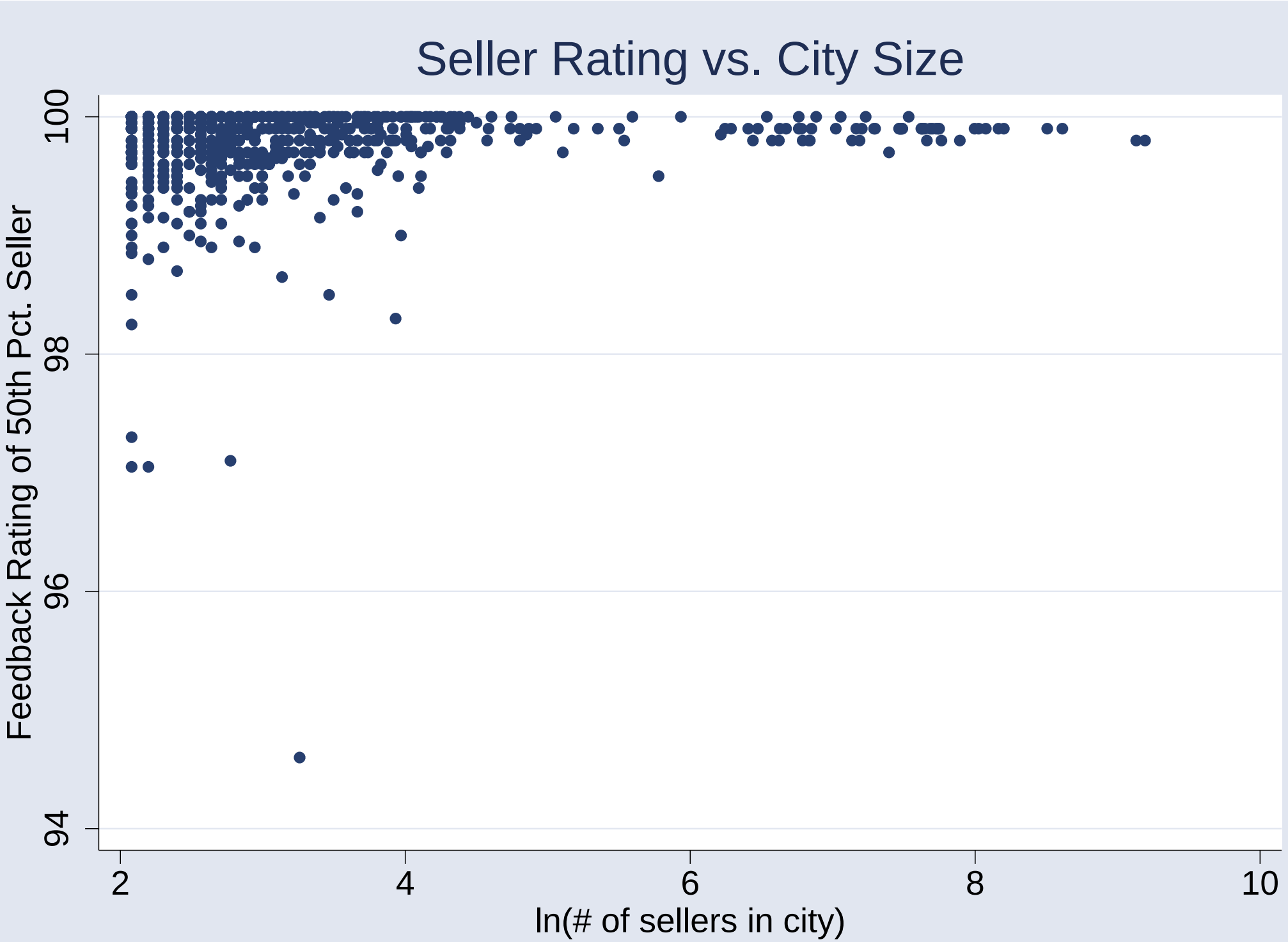

Seller Size vs. City Size
Ln(Total Feedback of Seller) -- 50th Pct.
2
4
6
8
10
ln(# of sellers in city)
2
4
6
8
10


Concentration vs. City Size
HHI in city
0
2000
4000
6000
8000
10000
2
4
6
8
10
ln(total # of sales by city)


Variety and Market Size
ln(# of product categories offered by city)
0
2
4
6
8
10
ln(total # of transactions in city)
0
2
4
6
8
10


Seller Rating vs. City Size
Feedback Rating of 10th Pct. Seller
0
20
40
60
80
100
2
4
6
8
10
ln(# of sellers in city)


Seller Rating vs. City Size
Feedback Rating of 25th Pct. Seller
100
90
80
70
2
4
6
8
10
ln(# of sellers in city)


Seller Rating vs. City Size
Feedback Rating of 50th Pct. Seller
100
98
96
94
2
4
6
8
10
ln(# of sellers in city)

Conclusions?

- "Driving distance" still seems to matter
  - But beyond driving distance, distance doesn't matter
- Speculations on market structure
  - Given existence of same-city bias, will Internet retailers in dense places (big cities) be larger?
  - Not necessarily, depends on how market "expands"
  - It appears that diversity of offerings grows along with density
  - Thus firms not much larger in big cities compared to firms in small cities
  - However, equilibrium quality provision is higher in big cities